

We claim:

1. A preformed stabilizer comprising the reaction product of:

- a) a Lewis acid catalyzed macromer; and
- b) at least one ethylenically unsaturated monomer;

wherein the macromer and the monomer are polymerized in the presence of at least one free radical initiator, a carrier polyol, and at least one phosphorous compound.

2. A preformed stabilizer as recited in claim 1, wherein said macromer comprises the reaction product of a polyol and a compound having both ethylenic unsaturation and a group reactive with an active hydrogen-containing group on the polyol in the presence of a Lewis acid.

3. A preformed stabilizer as recited in claim 2, wherein said compound having both ethylenic unsaturation and a group reactive with an active hydrogen containing group on the polyol comprises an isocyanate.

4. A preformed stabilizer as recited in claim 2, wherein said Lewis acid is at least one of tin-based, boron-based, aluminum-based, gallium-based, rare earth-based, zinc-based, and titanium-based compounds.

5. A preformed stabilizer as recited in claim 2, wherein said Lewis acid is present in an amount of from 0.2 to 50 parts per million based on the weight of the macromer.

6. A preformed stabilizer as recited in claim 2, wherein said Lewis acid is present in an amount of from 0.5 to 25 parts per million based on the weight of the macromer.

7. A preformed stabilizer as recited in claim 2, wherein said Lewis acid is present in an amount of from 1 to 15 parts per million based on the weight of the macromer.

8. A preformed stabilizer as recited in claim 1, wherein said ethylenically unsaturated monomer is selected from the group of acrylonitrile, styrene, and mixtures thereof.

9. A preformed stabilizer as recited in claim 1, wherein said phosphorous compound is selected from the group of phosphoric acid, phosphorous acid, compounds containing a phosphate anion, compounds containing a phosphite anion, and mixtures thereof.

10. A preformed stabilizer as recited in claim 1, wherein said phosphorous compound is present in weight to weight ratio of from 10:1 to 1:1 based on the weight of the Lewis acid used to form the macromer of step a).

11. A preformed stabilizer as recited in claim 1, wherein said phosphorous compound is present in an amount of from 0.2 to 500 parts per million based on the weight of the macromer.

12. A preformed stabilizer as recited in claim 1, wherein said phosphorous compound is present in an amount of from 0.5 to 250 parts per million based on the weight of the macromer.

13. A preformed stabilizer as recited in claim 1, wherein said phosphorous compound is present in an amount of from 1 to 150 parts per million based on the weight of the macromer.

14. A method for formation of a preformed stabilizer comprising the steps of:

- a) providing a Lewis acid catalyzed macromer;
- b) providing at least one ethylenically unsaturated monomer; and
- c) polymerizing the macromer and the monomer in the presence of at least one free radical initiator, a carrier polyol, and at least one phosphorous compound.

15. The method as recited in claim 14, wherein step a) comprises forming the macromer by reacting a polyol and a compound having both ethylenic unsaturation and a group reactive with an active hydrogen containing group on the polyol in the presence of a Lewis acid.

16. The method as recited in claim 15, comprising providing an isocyanate as the compound having both ethylenic unsaturation and a group reactive with an active hydrogen containing group on the polyol.

17. The method as recited in claim 15, comprising providing a Lewis acid that is at least one of tin-based, boron-based, aluminum-based, gallium-based, rare earth-based, zinc-based, and titanium-based compounds.

18. The method as recited in claim 15, comprising providing the Lewis acid in an amount of from 0.2 to 50 parts per million based on the weight of the macromer.

19. The method as recited in claim 15, comprising providing the Lewis acid in an amount of from 0.5 to 25 parts per million based on the weight of the macromer.

20. The method as recited in claim 15, comprising providing the Lewis acid in an amount of from 1 to 15 parts per million based on the weight of the macromer.

21. The method as recited in claim 14, wherein step b) comprises providing acrylonitrile, styrene, or a mixture thereof as the ethylenically unsaturated monomer.

22. The method as recited in claim 14, wherein step c) comprises providing phosphoric acid, phosphorous acid, a compound containing a phosphate anion, a compound containing a phosphite anion, or a mixture of two or more of these as the phosphorus compound.

23. The method as recited in claim 15, comprising the phosphorous compound in a weight to weight ratio of from 10:1 to 1:1 based on the weight of the Lewis acid used to form the macromer of step a).

24. The method as recited in claim 14, wherein step c) comprises providing the phosphorous compound in an amount of from 0.2 to 500 parts per million based on the weight of the macromer.

25. The method as recited in claim 14, wherein step c) comprises providing the phosphorous compound in an amount of from 0.5 to 250 parts per million based on the weight of the macromer.

26. The method as recited in claim 14, wherein step c) comprises providing the phosphorous compound in an amount of from 1 to 150 parts per million based on the weight of the macromer.

27. The method as recited in claim 14, wherein the at least one phosphorous compound is combined with one of the the Lewis acid catalyzed macromer or the carrier polyol prior to polymerizing the macromer and the monomer in the presence of at least one free radical initiator and a carrier polyol.

28. A final graft polyol comprising the reaction product of:

a) a Lewis acid catalyzed macromer; and

b) at least one ethylenically unsaturated monomer;

wherein the macromer and the monomer are polymerized in the presence of at least one free radical initiator, a carrier polyol, and at least one phosphorous compound.

29. A final graft polyol as recited in claim 28, wherein said macromer comprises the reaction product of a polyol and a compound having both ethylenic unsaturation and a group reactive with an active hydrogen containing group on the polyol in the presence of a Lewis acid.

30. A final graft polyol as recited in claim 29, wherein said compound having both ethylenic unsaturation and a group reactive with an active hydrogen-containing group on the polyol comprises an isocyanate.

31. A final graft polyol as recited in claim 29, wherein said Lewis acid is at least one of tin-based, boron-based, aluminum-based, gallium-based, rare earth-based, zinc-based, and titanium-based compounds.

32. A final graft polyol as recited in claim 29, wherein said Lewis acid is present in an amount of from 0.2 to 50 parts per million based on the weight of the macromer.

33. A final graft polyol as recited in claim 29, wherein said Lewis acid is present in an amount of from 0.5 to 25 parts per million based on the weight of the macromer.

34. A final graft polyol as recited in claim 29, wherein said Lewis acid is present in an amount of from 1 to 15 parts per million based on the weight of the macromer.

35. A final graft polyol as recited in claim 28, wherein said ethylenically unsaturated monomer is selected from the group of acrylonitrile, styrene, and mixtures thereof.

36. A final graft polyol as recited in claim 28, wherein said phosphorous compound is selected from the group of phosphoric acid, phosphorous acid, compounds containing a phosphate anion, compounds containing a phosphite anion, and mixtures thereof.

37. A final graft polyol as recited in claim 28, wherein said phosphorous compound is present in weight to weight ratio of from 10:1 to 1:1 based on the weight of the Lewis acid used to form the macromer of step a).

38. A final graft polyol as recited in claim 28, wherein said phosphorous compound is present in an amount of from 0.2 to 500 parts per million based on the weight of the macromer.

39. A final graft polyol as recited in claim 28, wherein said phosphorous compound is present in an amount of from 0.5 to 250 parts per million based on the weight of the macromer.

40. A final graft polyol as recited in claim 28, wherein said phosphorous compound is present in an amount of from 1 to 150 parts per million based on the weight of the macromer.

41. A final graft polyol as recited in claim 28, wherein the macromer and monomer are polymerized in the presence of at least one free radical initiator, a carrier polyol, at least one phosphorous compound and a preformed stabilizer.

42. A final graft polyol as recited in claim 41, wherein the preformed stabilizer is formed in the presence of a phosphorous compound.

43. A method for formation of a final graft polyol comprising the steps of:

- a) providing a Lewis acid catalyzed macromer;
- b) providing at least one ethylenically unsaturated monomer; and
- c) polymerizing the macromer and the monomer in the presence of at least one free radical initiator, a carrier polyol, and at least one phosphorous compound.

44. The method as recited in claim 43, wherein step a) comprises forming the macromer by reacting a polyol and a compound having both ethylenic unsaturation and a group reactive with an active hydrogen containing group on the polyol in the presence of a Lewis acid.



45. The method as recited in claim 44, comprising providing an isocyanate as the compound having both ethylenic unsaturation and a group reactive with an active hydrogen containing group on the polyol.

46. The method as recited in claim 44, comprising providing a Lewis acid that is at least one of tin-based, boron-based, aluminum-based, gallium-based, rare earth-based, zinc-based, and titanium-based compounds.

47. The method as recited in claim 44, comprising providing the Lewis acid in an amount of from 0.2 to 50 parts per million based on the weight of the macromer.

48. The method as recited in claim 44, comprising providing the Lewis acid in an amount of from 0.5 to 25 parts per million based on the weight of the macromer.

49. The method as recited in claim 44, comprising providing the Lewis acid in an amount of from 1 to 15 parts per million based on the weight of the macromer.

50. The method as recited in claim 43, wherein step b) comprises providing acrylonitrile, styrene, or a mixture thereof as the ethylenically unsaturated monomer.

51. The method as recited in claim 43, wherein step c) comprises providing phosphoric acid, phosphorous acid, a compound containing a phosphate anion, a compound

containing a phosphite anion, or a mixture of two or more of these as the phosphorus compound.

52. The method as recited in claim 44, comprising the phosphorous compound in a weight to weight ratio of from 10:1 to 1:1 based on the weight of the Lewis acid used to form the macromer of step a).

53. The method as recited in claim 43, wherein step c) comprises providing the phosphorous compound in an amount of from 0.2 to 500 parts per million based on the weight of the macromer.

54. The method as recited in claim 43, wherein step c) comprises providing the phosphorous compound in an amount of from 0.5 to 250 parts per million based on the weight of the macromer.

55. The method as recited in claim 43, wherein step c) comprises providing the phosphorous compound in an amount of from 1 to 150 parts per million based on the weight of the macromer.

56. The method as recited in claim 43, wherein the at least one phosphorous compound is combined with one of the the Lewis acid catalyzed macromer or the carrier polyol prior to polymerizing the macromer and the monomer in the presence of at least one free radical initiator and a carrier polyol.

57. The method as recited in claim 43, wherein step c) further comprises polymerizing the macromer and the monomer in the presence of at least one free radical initiator, a carrier polyol, at least one phosphorous compound, and a preformed stabilizer.

58. The method as recited in claim 57, further comprising forming the preformed stabilizer in the presence of a phosphorous compound.

59. A method for formation of a final graft polyol comprising the steps of:

- a) providing a preformed stabilizer as recited in claim 1;
- b) providing at least one ethylenically unsaturated monomer; and
- c) polymerizing the preformed stabilizer and the monomer in the presence of at least one free radical initiator, a carrier polyol, and at least one phosphorous compound.

60. A final graft polyol made in accordance with the process as recited in claim 59.